

EFFECTIVE USE OF SLAUGHTER CHECKS TO DETERMINE ECONOMIC LOSSES FROM
MORBIDITY IN SWINE

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SUMMARY

Swine producers are faced with numerous economic decisions on animal health and associated control levels. Knowledge of disease problems and economic losses enables producers to more effectively control and/or eliminate disease from the herd. Pneumonia losses in batch production ranged from \$1.31 per hog in the winter of 1986 to \$.89 per hog in the following summer and back up to \$1.26 per hog for the winter 1987 check. Pneumonia losses for the continuous producer averaged \$5.48 per hog space per year. On average, losses for the winter checked hogs were about 50 percent greater than for the summer checked hogs. Atrophic rhinitis (AR) losses for a batch producer went from \$.54 per hog in the winter of 1986 to \$1.37 per hog in the following summer and back down to \$.50 for the winter 1987 check. AR losses for a continuous producer was \$4.75 per hog space per year.

INTRODUCTION

Surveillance of animals for disease symptoms enables producers to more successfully deal with disease problems. With this information they can more effectively evaluate disease and associated prevention and treatment programs. Animal disease surveillance methods range from slaughter check observations to visual inspection of the live animal for disease evidence. Disease can be clinical or subclinical. In the clinical stage, symptoms are more clearly manifested and diagnosed via visual inspection of the live animal. However, subclinical disease symptoms are not readily apparent. Nonetheless subclinical disease can cause significant losses. Obviously if production efficiency is affected, there is a point where economic efficiency suffers as well. In 1984, the Elanco Products Company and the National Pork Producers Council sponsored slaughter checks to increase awareness of the nature and prevalence of respiratory disease [Elanco]. The average pneumonia level, measured in percent of total lung area affected by pneumonic lesions was 7.4 percent.

MATERIALS AND METHODS

This study focuses on effective use of slaughter checks as a swine disease management practice. Three slaughter checks were conducted for 21

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farrow-to-finish producers at six month intervals. Each producer was surveyed prior to initiation of the study to obtain information on production practices, facilities, etc.

Information on pneumonia, atrophic rhinitis (AR), ascarid migration, pleritis, pericarditis, and arthritis, was recorded. Observations on AR were obtained through individual snout observations. Pneumonia observations were based on evaluations of each lung on a lobe by lobe basis and then weighted into a value representing total lung area affected. For consistency, the slaughter checks were conducted by the same veterinarian.

Data were analyzed for differences by season of the year and by type of production facility [Boessen]. Economic losses from pneumonia and AR were evaluated for continuous production and batch production systems. In batch production only one or two groups of hogs are produced per year. With continuous production, production delays can cause severe problems throughout the system.

The economic impact of disease was projected through use of average daily gain (ADG) and feed efficiency (FE) measures. For this study changes in ADG associated with various pneumonia levels were pulled from the impacts determined in the Elanco study. Studies investigating changes in feed efficiency (FE) in relation to pneumonia and AR have produced highly variable results. A number of studies have reported changes in FE of the same magnitude as the change in ADG. However, others have reported little, if any change in FE while observing substantial changes in ADG. In light of these results it was assumed that the quantity of feed required per pound of gain (FE) will increase by one half of the prescribed percentage change in ADG associated with a given disease level. For example, if ADG was impacted by 10 percent, FE was impacted by 5 percent.

To measure loss levels, profit functions were established for batch and continuous production systems. In a batch production system profit is represented as follows:

$$PH = RH - TVCH - FCH \quad (1)$$

$$= (ADG \times P_g \times DOF) - (ADG \times FE \times P_f \times DOF) - (DNFVC \times DOF) - (FCH) \quad (2)$$

where: PH = Profit Per Hog; RH = Revenue Per Hog; TVCH = Total Variable Cost Per Hog; FCH = Fixed Cost Per Hog (depreciation, taxes, etc.); ADG = Average Daily Gain; FE = Feed Efficiency; P_g = Selling Price of Gain; DOF = Days on Feed; P_f = Price of Feed; DNFVC = Daily Non-feed Variable Cost (labor, utilities, etc.). Equation (2) expands the components of Eq. (1) in terms of ADG and FE. With a continuous production scenario, the underlying objective would be to maximize returns to the system per unit of time rather than to maximize profit per animal. Consistent with this goal would be an operation which evaluated production with respect to profit per unit of production space per day. If the unit of capacity is assumed to be that required for one hog, the profit function would be represented by Eq. (3).

$$\text{Profit/Day} = (ADG \times P_g) - (ADG \times FE \times P_f) - (DNFVC) - (FC) \quad (3)$$

where terminology is as indicated above. The variables Profit/Day, ADG, FE, DNFVC and FC are on a per space basis. In this instance daily revenue ($ADG \times P_g$) and daily feed costs ($ADG \times FE \times P_f$) are the only items affected by a change in ADG and FE. An additional assumption in this case is that daily

non-feed variable costs (machinery, utilities etc.) per space are not performance related. Fixed costs (depreciation, taxes etc.) per space per day are also unaffected by changes in pig performance. The hog selling price is incorporated in the continuous production analysis as revenue level is affected by changes in ADG.

DISCUSSION

Examination of Eq. (2) shows that in a batch production system disease delays realization of revenue. An assumption here is that the hog will reach the specified market weight before the next batch is ready to enter the system. Under this scenario fixed costs per pig are not affected. For a continuous production system (Eq. 3), the effect of a decrease in ADG and FE is a reduction in the daily revenue over feed costs which is available to cover non-feed variable and fixed costs per space per day. This equates to a decreased profit per space per day. For a group of slaughter checked hogs with a known ADG and FE, profit/space/day can be calculated. The amount that profit/space/day is reduced is determined by subtracting the profit/space/day with disease from the amount calculated based on a "disease free" ADG and FE. Annualizing system losses per year would merely require multiplying the calculated decreased profit/space/day by the system capacity, then by 365.

Corn and hog prices have an effect on economic loss levels. Increase feed requirements have economic loss levels which are impacted by feed prices. Economic loss from reduced growth rates are impacted by the hog price. Knowledge of disease level is needed to estimate increased costs due to disease. Once this information is known, the effect of disease on ADG can be determined. To determine economic loss, individual hog data, not averages, is needed as the relationship between many disease levels and ADG impact is non-linear.

For a continuous production system pneumonia levels observed in the winter 1987, summer 1986 and winter 1986 checks equated to a loss in profit/space/day of 1.8 cents, 1.2 cents and 1.9 cents respectively. The average loss in profit/space/day due to pneumonia was 1.5 cents or \$5.48/space/year. A grow-finish facility with the capacity to handle 1,000 head at a time could experience a loss in profit to the system per year of \$5,480. AR levels observed in the winter 1987, summer 1986, and winter 1986 periods resulted in projected loss levels of .7 cents, 1.9 cents and .7 cents respectively or an average of 1.3 cents per space per day. This is \$4.75 per year or \$4,750 for a 1,000 head facility. For a batch production system pneumonia losses averaged \$1.09 per hog; \$1.29 for winter checked hogs and \$.89 for summer checked hogs. AR losses averaged \$.95 per hog; \$.52 for winter checked hogs and \$1.37 for summer checked hogs.

REFERENCES

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